DUFFIELD ASSOCIATES, INC.
5400 LIMESTONE ROAD WILMINGTON, DELAWARE 19808 302-239-6634
CONSULTING GEOTECHNICAL ENGINEERS

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JLP
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FILE 5

April 17, 1985

ORIGINAL
(Red)

Mr. James Rohrbach
Facility Engineer
Delaware Solid Waste Authority
1101 Lambson Lane
New Castle, DE 19720

W.O. 260-B
RE: Northern Solid Waste Facility-1
Quarterly Water Level Monitoring
March 1985 Sampling Sequence
Permit Year 1984-1985

Dear Mr. Rohrbach:

During the period of 18 through 27 March 1985, we obtained groundwater level measurements as a part of the Quarterly Groundwater Monitoring program at the Northern Solid Waste Facility-1. Also during this period, we performed quarterly groundwater sampling and field quality testing. This sampling was performed in accordance with the schedule for water quality testing, transmitted to your office with our letter of February 28, 1985. The schedule was amended prior to the commencement of this sampling to reflect abandonment of observation wells 37, 37A, and well 50 and installation of observation well No. 52 on February 27, 1985. Copies of this sampling schedule was transmitted to Brandt Associates, Inc. to aid them in scheduling of laboratory testing. This sampling schedule included at your request, the required testing as outlined in Permit SW-84/17 along with recommended additional testing from this and previous permit years. A copy of this schedule was transmitted to your office for your review and approval prior to commencement of the testing program.

Tabular summaries of The groundwater elevation and field water quality testing results are included for your use and for submittal to the Delaware Department of Natural Resources.

Mr. James Rohrbach
April 17, 1985
Page Two

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Comparison of water table elevation data, obtained during this period, with that obtained during previous periods indicates a slight general increase in water table elevation between December 1984 and March 1985. This general increase in water table elevation is consistent with historical trends of the facility and is consistent with our experience with other areas of New Castle County during this same period. Despite this fluctuation, groundwater flow in the water table stratum, which includes Recent deposits, dredge spoils, and solid waste fill, has apparently maintained the historical pattern of radial flow in all directions from the elevated mound within the refuse fill and towards the site perimeter.

Comparison of the piezometric elevation data for the Pleistocene age stratum (Columbia Formation) indicates a slight general <u>decrease</u> in piezometric levels between December 1984 and March 1985, which is contrary to the historical fluctuation patterns. The magnitude of that decrease is greatest for observation well 27R. The indicated flow gradient is west to southwesterly away from the facility. This is in contrast to the northwesterly gradient, observed over the past several quarters since the excavation of the DRP firepond, but is a similar pattern, observed before excavation of the DRP fire pond.

As discussed previously we are of the opinion that the DRP fire pond at the time of construction was in direct hydrologic continuity with the Columbia Formation. When the water level in the Columbia Formation exceeds the fire pond invert elevation, the fire pond acts as a local groundwater discharge point for the formation. Conversely, at times when the local water level in the Columbia Formation is lower than that of the DRP fire pond, the fire pond recharges the Columbia Formation. During the March 1985 measurements, we recorded water levels in observation well 25R, which were slightly lower than that of the fire pond invert and the measured water level in the fire pond. This indicates the possibility of leakage from the DRP fire pond into the formation. In our opinion, the potential for this leakage is limited by relatively small head differential, between the fire pond and the formation, as well as the likelihood that silt accumulations in the DRP fire pond would act to impede hydraulic continuity with the formation.

Piezometric elevation data recorded for the Potomac Formation during this period show water level elevations which [illegible] the historical range of fluctuation for this [illegible] facility. [illegible]

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Enclosed with this letter are tabular summaries of temperature, pH and specific conductance data which were performed in the field during the sampling period. Separate tables are provided for submission to the DNREC and for Authority use.

If you have any questions concerning the above, please contact us.

Very truly yours,

DUFFIELD ASSOCIATES, INC.

"non responsive based on revised scope"

Partner

"non responsive based on revised scope"

Enclosures: Groundwater Elevation March 1985
Groundwater Elevation Summary for Permit Year 1984-1985
Northern Solid Waste Facility-1 Field Determined
pH Testing Permit Year 1984-1985 March 1985 Sampling
Northern Solid Waste Facility-1 Field Determined
Water Quality Parameters March 1, 1985

cc: Mr. "non responsive based on revised scope", P.E.

Duffield Associates, Inc.

NORTHERN SOLID WASTE FACILITY-1
GROUNDWATER ELEVATION
MARCH 1985
PERMIT YEAR 1984-1985

Interior (Base of Landfill)	Elevation	Date Measured
Ob. Well		
46	N.D.	3/22/85
47	37 ft.±	3/22/85
48	52 ft.±	3/22/85
49	17.5 ft.±	3/20/85
Recent Deposits & Dredge Spoils		
(Water Table)		
Ob. Well		
1	13.35 ft.	3/20/85
28A	12.5 ft.	3/25/85
29A	11 ft.	3/25/85
31A	13 ft.	3/25/85
32A	12 ft.	3/25/85
37	N.D.	Well abandoned 2/27/85
39	11.8 ft.	3/25/85
40	13.6 ft.	3/21/85
41	2.1 ft.	3/21/85
42	8.1 ft.	3/21/85
52	16.1 ft.±	3/26/85
(Basal Zones)		
Ob. Well		
24	0.4 ft.	3/25/85
32	11.9 ft.	3/25/85
37A	N.D.	Well abandoned 2/27/85
42A	7.4 ft.	3/21/85
Columbia (Pleistocene) Sands		
Ob. Well		
1A	1.1 ft.	3/20/85
25R	3.05 ft.	3/21/85
27R	1.35 ft.	3/21/85
50	N.D.	Well abandoned 2/27

NORTHERN SOLID WASTE FACILITY-1
GROUNDWATER ELEVATION
MARCH 1985
PERMIT YEAR 1984-1985

Potomac Sands	Elevation	Date Measured
Ob. Well 26R	-2.4 ft.	3/25/85
28	-0.4 ft.	3/22/85
29	-3.35 ft.	3/22/85
31	2.85 ft.	3/26/85
41A	0.25 ft.	3/22/85
45	-8 ft.	3/22/85

NOTES:

1) N.G.S. 1929 Sea Level Datum: Utilizing August 1983 revised reference elevation data.
2) Observation wells abandoned 2/27/85 as a part of ongoing construction of the Energy Generation Facility, Pigeon Point.

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W.O. 260B

NORTHERN SOLID WASTE FACILITY-1
FIELD DETERMINED PH MEASUREMENTS
PERMIT YEAR 1984-1985
MARCH 1985

Observation Well No.	pH (1)	Date Sampled
1	7.0	3/20/85
1A	6.3	3/20/85
25R	6.0	3/20/85
26R	6.1	3/25/85
27R	6.3	3/20/85
28	5.7	3/22/85
29	6.3	3/22/85
29A	5.2	3/25/85
32A	6.5	3/25/85
37A	Well abandoned	2/27/85 (2)
41	6.5	3/21/85
45	5.7	3/22/85
46	7.1	3/27/85
47	7.3	3/22/85
48	7.8	3/22/85
49	7.2	3/22/85
Manhole Designation		
EMH	6.9	3/19/85
WMH	7.2	3/19/85
SWLS	7.1	3/19/85

1) Standard pH units.
2) Well abandoned as a part of ongoing construction of the Energy Generation Facility.

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GROUNDWATER ELEVATION
SUMMARY FOR PERMIT YEAR 1984 - 1985
PERMIT NO. SW - 84/17

Observation Well No.	September 1984	December 1984	March 1985	June 1985
Interior (Base of Landfill)				
46	N.D.	N.D.	N.D.	
47	42.0 ft.±	38.5 ft.±	37.0 ft.±	
48	53.5 ft.±	53.0 ft.±	52.0 ft.±	
49	19.5 ft.±	N.D.	17.5 ft.±	
Recent Deposits & Dredge Spoils (Water Table)				
1	12.85 ft.	12.90 ft.	13.35 ft.	
28A	8.90 ft.	12.10 ft.	12.5 ft.	
29A	8.95 ft.	10.60 ft.	11.0 ft.	
31A	12.55 ft.	N.D.	13.0 ft.s	
32A	11.00 ft.	12.50 ft.	12.0 ft.	
37	13.95 ft.	13.20 ft.	Well Abandoned 2/27/85(3)	
39	10.00 ft.	10.45 ft.	11.8 ft.	
40	13.40 ft.	13.20 ft.	13.6 ft.	
41	1.20 ft.	1.80 ft.	2.1 ft.	
42	6.90 ft.	8.20 ft.	8.1 ft.	
52			16.0 ft.±	
Basal Zones				
24	0.60 ft.	0.65 ft.	0.4 ft.	
32	11.65 ft.	11.80 ft.	11.9 ft.	
37A	14.55 ft.	14.40 ft.	Well Abandoned 2/27/85(3)	
42A	7.10 ft.	7.35 ft.	7.4 ft.	
Columbia (Pleistocene) Sands				
1A	4.10 ft.	4.20 ft.	4.1 ft.	
25R	3.95 ft.	3.60 ft.	3.25 ft.	
27R	3.80 ft.	2.55 ft.	1.95 ft.	
50	4.20 ft.	4.15 ft.	Well Abandoned 2/27/85(3)	

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GROUNDWATER ELEVATION
SUMMARY FOR PERMIT YEAR 1984 - 1985
PERMIT NO. SW - 84/17

Observation Well No.	September 1984	December 1984	March 1985	June 1985
Potomac Sands				
26R	-1.75 ft.	-1.95 ft.	-2.4 ft.	
28	0.45 ft	0.20 ft.	- 0.4 ft.	
29	-5.75 ft.	-4.65 ft.	-3.35 ft.	
31	3.70 ft.	3.40 ft.	2.85 ft.	
41A	1.10 ft.	1.05 ft.	0.25 ft.	
45	-8.95 ft.	-7.44 ft.	-8.0 ft.	

NOTES:

1) N.G.S. 1929 Sea Level Datum: Utilizing August 1983 revised reference elevation data.
2) N.G.S. 1929 Sea Level Datum: Utilizing January 1985 revised reference elevation data.
3) Observation wells abandoned 2/27/85 as a part of ongoing construction of the Energy Generation Facility, Pigeon Point.

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Duffield Associates, Inc.

W.O. 260B

NORTHERN SOLID WASTE FACILITY-1 (1)
FIELD DETERMINED WATER QUALITY PARAMETERS

MARCH 1985
PERMIT YEAR 1984-1985
PERMIT NO. SW - 84/17

Observation Well No.	Temperature (2) °C	Specific Conductance (3) (umhos/cm-20)	(4) pH	Date Sampled
Interior (Base of Landfill)				
46	38.0	8,000	7.1	3/27/85
47	34.6	9,250	7.3	3/22/85
48	34.0	15,500	7.8	3/22/85
49	34.0	12,250	7.2	3/22/85
Recent Deposits & Dredge Spoils (Water Table)				
1	11.8	1,700	7.0	3/20/85
28A	10.4	570	5.8	3/25/85
29A	10.6	550	5.2	3/25/85
31A	14.0	3,250	6.7	3/25/85
32A	11.6	1,600	6.5	3/25/85
37	Well abandoned 2/27/85		(5)	
39	10.6	675	6.5	3/25/85
40	11.4	1,850	6.3	3/21/85
41	12.5	1,600	6.5	3/21/85
42	14.4	1,800	6.4	3/21/85
52	13.5	4,000	6.4	3/26/85
Basal Zones				
32	11.4	2,000	6.5	3/25/85
37A	Well abandoned 2/27/85		(5)	
42A	12.6	2,250	6.6	3/21/85

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Duffield Associates, Inc.

NORTHERN SOLID WASTE FACILITY-1 (1)
FIELD DETERMINED WATER QUALITY PARAMETERS

MARCH 1985
PERMIT YEAR 1984-1985
PERMIT NO. SW - 84/17

Observation Well No.	Temperature (2) °C	Specific Conductance (3) (umhos/cm-20)	(4) pH	Date Sampled
Columbia (Pleistocene) Sands				
1A	14.5	1,900 ✓	6.3 ✓	3/20/85
25R	13.7	1,100 ✓	6.0 ✓	3/20/85
27R	12.7	N.D. ✓	6.3 ✓	3/20/85
50	Well abandoned 2/27/85		(5)	
Potomac Sands				
26R	12.9	2,000 ✓	6.1 ✓	3/25/85
28	12.6	1,650 ✓	5.7 ✓	3/22/85
29	11.9	1,300 ✓	6.3 ✓	3/22/85
41A	12.1	1,400 ✓	5.9 ✓	3/22/85
45	12.6	155 ✓	5.7 ✓	3/22/85
Manhole Designation				
ECM	20.5	8,500 ✓	6.9 ✓	3/19/85
WCM	17.9	7,750 ✓	7.2 ✓	3/19/85
SWLS	17.6	1,700 ✓	7.1 ✓	3/19/85
NWLS	9.9	6,000 ✓	6.7 ✓	3/19/85
DRP Firepond	6.1	650 ✓	7.6 ✓	3/20/85

NOTES:

(1) Testing performed on unfiltered samples.
(2) Unless otherwise noted, stabilized temperature of pump output during well purging.
(3) Specific conductance temperature compensated to 20 C.
(4) Standard pH units.
(5) Wells 37, 37A and 50, abandoned as a part of ongoing construction of the Energy Generation Facility.

Nothern Solid Waste Fac ty
Analytical Report No. 393.17001

Prepared for: Mr. Rohrbach
Date: June 18, 1985

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RECEIVED
JUN 24 1985
DELAWARE
SOLID WASTE AUTHORITY

JLP
PSC
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FILE 2

Compound	393-107-101 NW Lift Station (mg/l)
PCB-1242	< 1
PCB-1254	< 1
PCB-1221	< 1
PCB-1232	< 1
PCB-1248	< 1
PCB-1260	< 1
PCB-1016	< 1
	< 1

Sample Date/Time: 4-17-85/Not Given

Detection limit for the above analyses is one milligram per liter.

Testing performed by:

CVI
PO Box 796
Easton, PA 18042
Tele: (215) 258-2911

"non responsive based on revised scope"
[redacted]